

We claim:

- 1           1.     A semiconductor laser device including:  
2                 (a)     a first oxide layer defining a first aperture;  
3                 (b)     a second oxide layer defining a second aperture; and  
4                 (c)     an active region located between the apertures;  
5                 the apertures being of sizes and distances from a center of the active region to induce  
6                 a near-Gaussian shape of spatial current density distribution.
- 1           2.     The laser device according to claim 1, having a p-mirror on one side of the  
2                 active region and an n-mirror on another side of the active region, and wherein the first oxide  
3                 layer is p-mirror oxide layer and the second oxide layer is an n-mirror oxide layer.
- 1           3.     The laser device according to claim 2, wherein the first and second oxide  
2                 layers and the first and second apertures defined differ in distance from the center of the  
3                 active region.
- 1           4.     The laser device according to claim 2, wherein the size of the first aperture is  
2                 smaller than the size of the second aperture.
- 1           5.     The laser device according to claim 3, wherein the size of the first aperture is  
2                 smaller than the size of the second aperture.
- 1           6.     The laser device according to claim 3, wherein each of the mirrors comprise  
2                 stacks of mirror pairs, the first aperture is spaced at substantially three to twenty mirror pairs  
3                 from the active region and the second aperture is spaced at substantially one to four mirror  
4                 pairs from the active region.
- 1           7.     The laser device according to claim 4, wherein each of the mirrors comprises  
2                 stacks of mirror pairs, the first aperture is spaced at substantially three to twenty mirror pairs  
3                 from the active region and the second aperture is spaced at substantially one to four mirror  
4                 pairs from the active region.
- 1           8.     The laser device according to claim 3, wherein the first aperture is  
2                 substantially 3 to 20 $\mu$ m across and the second aperture is substantially 5 to 30 $\mu$ m across.

1           9.       The laser device according to claim 4, wherein the first aperture is  
2 substantially 3 to 20 $\mu$ m across and the second aperture is substantially 5 to 30 $\mu$ m across.

3           10.      The laser device according to claim 7, wherein the first aperture is  
4 substantially 3 to 20 $\mu$ m across and the second aperture is substantially 5 to 30 $\mu$ m across.

1           11.      In a VCSEL having an active region, a first stack of mirror pairs on one side  
2 of the active region and a second stack of mirror pairs on a second side of the active region;  
3 the improvement comprising a first oxide aperture of a first size on the one side of the active  
4 region at a first distance from a center of the active region and a second oxide aperture of a  
5 second size on the second side of the active region at a second distance from the center of the  
6 active region.

1           12.      The VCSEL according to claim 11, wherein the first aperture size differs from  
2 the second aperture size and the first distance differs from the second distance.

1           13.      The VCSEL according to claim 12, wherein the first aperture size is smaller  
2 than the second aperture size and the first distance is greater than the second distance.

1           14.      The VCSEL according to claim 13, wherein the first aperture size is  
2 substantially 5 to 30 $\mu$ m across, the first distance is substantially 3 to 20 mirror pairs along the  
3 first mirror pair stack and the second distance is substantially one to four mirror pairs along  
4 the second mirror stack.

1           15.      The VCSEL according to claim 11, further including a substrate upon which  
2 the active region and first and second mirror stacks are grown, a via into the substrate and  
3 into proximity with one of said mirror stacks, heat conductive plating extending from an  
4 outer surface into the via.

1           16.      The VCSEL according to claim 14, further including a substrate upon which  
2 the active region and first and second mirror stacks are grown, a via into the substrate and  
3 into proximity with one of said mirror stacks, heat conductive plating extending from an  
4 outer surface into the via.

1           17.      The VCSEL according to claim 11, further comprising a heat sink supporting  
2 the active region and the first and second mirror stacks, said heat sink extending into heat  
3 conducting relation to one of the mirror stacks.

1           18.     The VCSEL according to claim 13, further comprising a heat sink supporting  
2 the active region and the first and second mirror stacks, said heat sink extending into heat  
3 conducting relation to one of the mirror stacks.